

100V NPN HIGH VOLTAGE TRANSISTOR IN TO252
Description

This Bipolar Junction Transistor (BJT) has been designed to meet the stringent requirements of Automotive Applications.

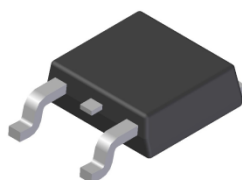
Features

- $BV_{CEO} > 100V$
- $I_C = 3A$ high Continuous Collector Current
- $I_{CM} = 5A$ Peak Pulse Current
- Ideal for Power Switching or Amplification Applications
- Complementary PNP Type: MJD32CQ
- **Totally Lead-Free & Fully RoHS compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**
- **PPAP Capable (Note 4)**

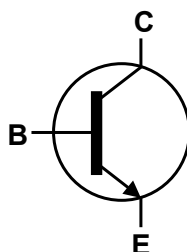
Mechanical Data

- Case: TO252 (DPAK)
- Case Material: Molded Plastic, "Green" Molding Compound
UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – Matte Tin Plated Leads, Solderable per
MIL-STD-202, Method 208 
- Weight: 0.34 grams (approximate)

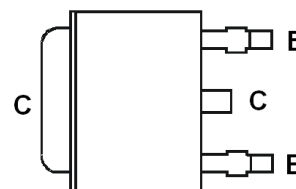
TO252 (DPAK)



Top View



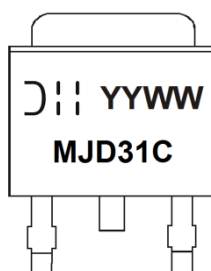
Device Schematic


 Pin Out Configuration
Top view

Ordering Information (Notes 4 & 5)

Product	Compliance	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
MJD31CQ-13	Automotive	MJD31C	13	16	2,500

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
 2. See http://www.diodes.com/quality/lead_free.html for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
 3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
 4. Automotive products are AEC-Q101 qualified and are PPAP capable. Automotive, AEC-Q101 and standard products are electrically and thermally the same, except where specified. For more information, please refer to http://www.diodes.com/quality/product_compliance_definitions/.
 5. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

Marking Information


MJD31C = Product Type Marking Code
 DII = Manufacturers' code marking
 YYWW = Date Code Marking
 YY = Last Digit of Year (ex: 10 = 2010)
 WW = Week Code (01 – 53)

Absolute Maximum Ratings (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V _{CBO}	100	V
Collector-Emitter Voltage	V _{CEO}	100	V
Emitter-Base Voltage	V _{EBO}	6	V
Continuous Collector Current	I _C	3	A
Peak Pulse Collector Current	I _{CM}	5	A
Continuous Base Current	I _B	1	A

Thermal Characteristics (@T_A = +25°C, unless otherwise specified.)

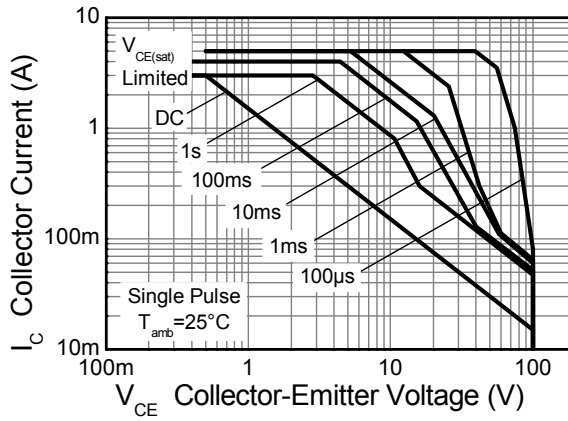
Characteristic	Symbol	Value	Unit
Power Dissipation	P _D	3.9	W
		2.1	
		1.6	
		15	
Thermal Resistance, Junction to Ambient Air	R _{θJA}	32	°C/W
		59	
		80	
Thermal Resistance, Junction to Leads	R _{θJL}	8.4	
Operating and Storage Temperature Range	T _J , T _{STG}	-55 to +150	°C

ESD Ratings (Note 10)

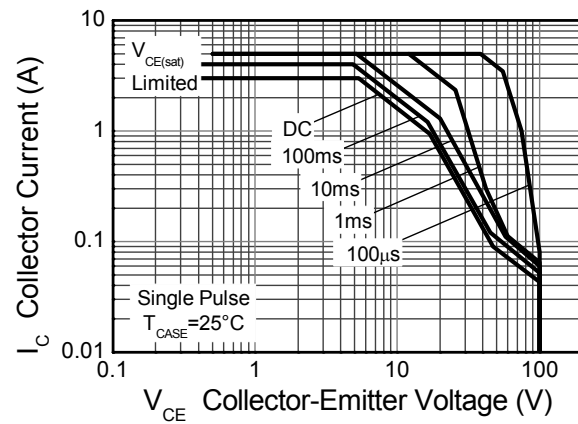
Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge - Human Body Model	ESD HBM	4,000	V	3A
Electrostatic Discharge - Machine Model	ESD MM	400	V	C

- Notes:
- For a device mounted with the exposed collector pad on 50mm x 50mm 2oz copper that is on a single-sided 1.6mm FR4 PCB; device is measured under still air conditions whilst operating in a steady-state.
 - Same as note (6), except mounted on 25mm x 25mm 1oz copper.
 - Same as note (6), except mounted on minimum recommended pad (MRP) layout.
 - Thermal resistance from junction to solder-point (on the exposed collector pad).
 - Refer to JEDEC specification JESD22-A114 and JESD22-A115.

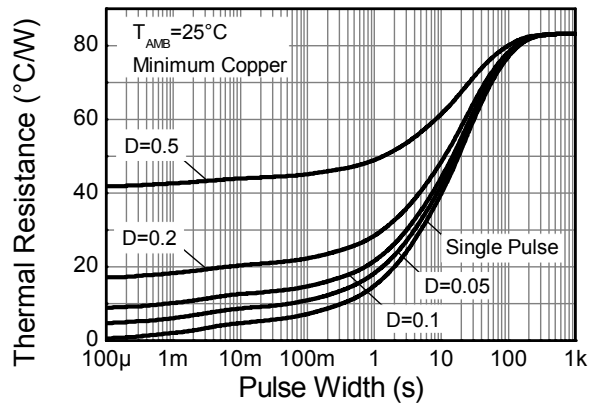
Thermal Characteristics



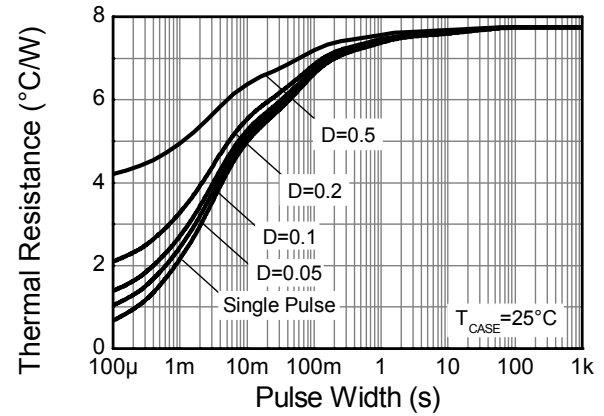
Safe Operating Area



Safe Operating Area



Transient Thermal Impedance



Transient Thermal Impedance

Electrical Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Emitter Breakdown Voltage (Note 11)	BV_{CEO}	100	—	—	V	$I_C = 30\text{mA}$, $I_B = 0$
Collector Cut-off Current	I_{CEO}	—	—	1	μA	$V_{CB} = 60\text{V}$, $I_B = 0$
Collector Cut-off Current	I_{CES}	—	—	1	μA	$V_{CE} = 100\text{V}$, $V_{EB} = 0$
Emitter Cut-off Current	I_{EBO}	—	—	1	μA	$V_{EB} = 5\text{V}$, $I_C = 0$
Collector-Emitter Saturation Voltage (Note 11)	$V_{CE(sat)}$	—	—	1.2	V	$I_C = 3.0\text{A}$, $I_B = 375\text{mA}$
Base-Emitter Turn-On Voltage (Note 11)	$V_{BE(on)}$	—	—	1.8	V	$I_C = 3\text{A}$, $V_{CE} = 4\text{V}$
DC Current Gain (Note 11)	h_{FE}	25 10	—	50	—	$V_{CE} = 4\text{V}$, $I_C = 1\text{A}$ $V_{CE} = 4\text{V}$, $I_C = 3\text{A}$
Current Signal Current Gain	H_{fe}	20	—	—	—	$V_{CE} = 10\text{V}$, $I_C = 0.5\text{A}$, $f = 1\text{KHz}$
Current Gain-Bandwidth Product	f_T	3.0	—	—	MHz	$I_C = 500\text{mA}$, $V_{CE} = 10\text{V}$, $f = 1\text{MHz}$

Note: 11. Measured under pulsed conditions. Pulse width $\leq 300\mu\text{s}$. Duty cycle $\leq 2\%$.

Typical Electrical Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

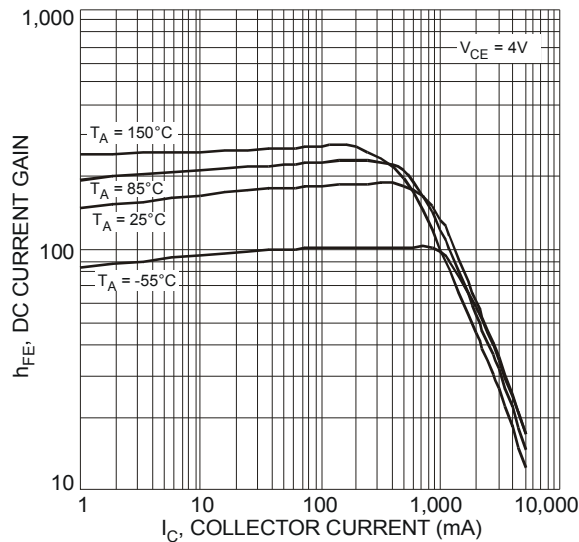


Figure 1 Typical DC Current Gain vs. Collector Current

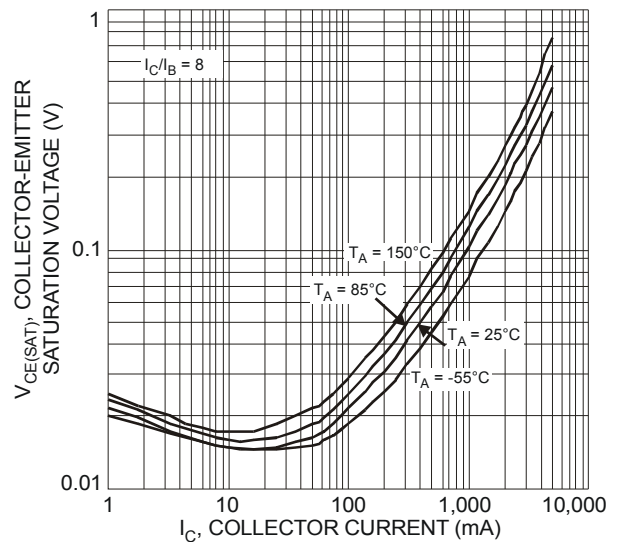


Figure 2 Typical Collector-Emitter Saturation Voltage vs. Collector Current

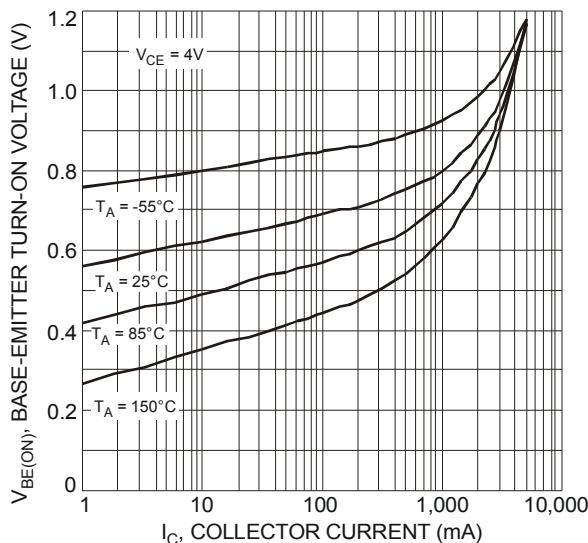


Figure 3 Typical Base-Emitter Turn-On Voltage vs. Collector Current

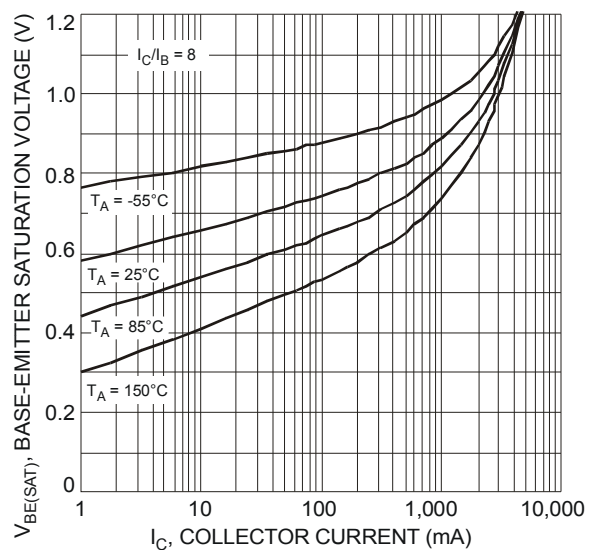


Figure 4 Typical Base-Emitter Saturation Voltage vs. Collector Current

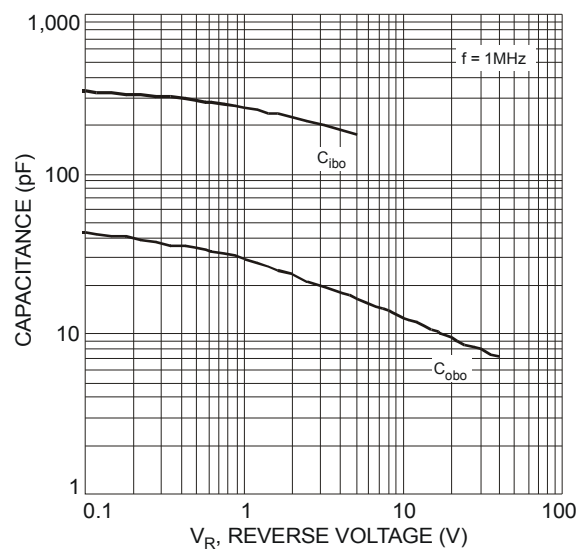
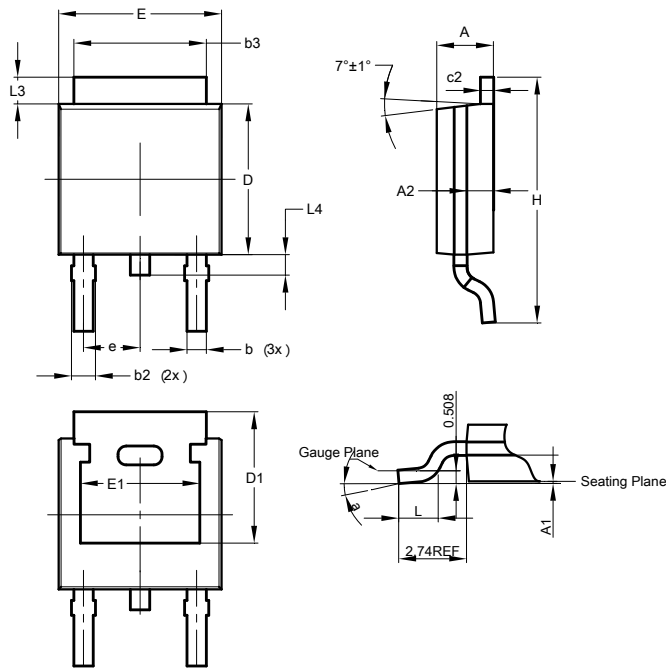


Figure 5 Typical Capacitance Characteristics

Package Outline Dimensions

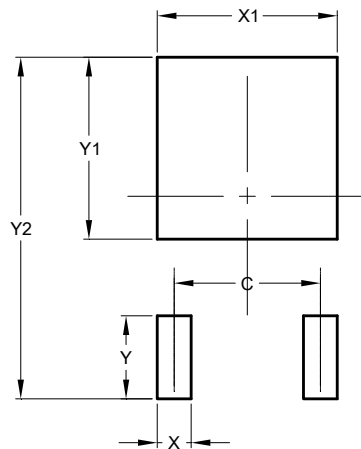
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



TO252			
Dim	Min	Max	Typ
A	2.19	2.39	2.29
A1	0.00	0.13	0.08
A2	0.97	1.17	1.07
b	0.64	0.88	0.783
b2	0.76	1.14	0.95
b3	5.21	5.46	5.33
c2	0.45	0.58	0.531
D	6.00	6.20	6.10
D1	5.21	—	—
e	—	—	2.286
E	6.45	6.70	6.58
E1	4.32	—	—
H	9.40	10.41	9.91
L	1.40	1.78	1.59
L3	0.88	1.27	1.08
L4	0.64	1.02	0.83
a	0°	10°	—
All Dimensions in mm			

Suggested Pad Layout

Please see AP02001 at <http://www.diodes.com/datasheets/ap02001.pdf> for the latest version.



Dimensions	Value (in mm)
C	4.572
X	1.060
X1	5.632
Y	2.600
Y1	5.700
Y2	10.700

Note: For high voltage applications, the appropriate industry sector guidelines should be considered with regards to creepage and clearance distances between device Terminals and PCB tracking.

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